

Southface Energy Institute

responsible solutions for environmental living

- Education and Research
- Policy
- Green Building Services
 - commercial
 - residential
 - communities
- Greenprints
March 22-23, 2007



www.southface.org

Southface Energy and Environmental Resource Center

- Conserves natural resources
- Reduces air and water pollution
- Provides a healthy indoor environment
- Saves money



The Southeast's first Energy Star building

Eco Office

Architect

Lord, Aeck & Sargent, Inc.

Contractor—

Eco Office Contractors: A
Consortium of Green Builders

DPR Construction

Hardin Construction Co., LLC

Holder Construction Co.

R. J. Griffin & Co.

Skanska USA Building

The Winter Construction
Company



Eco Office

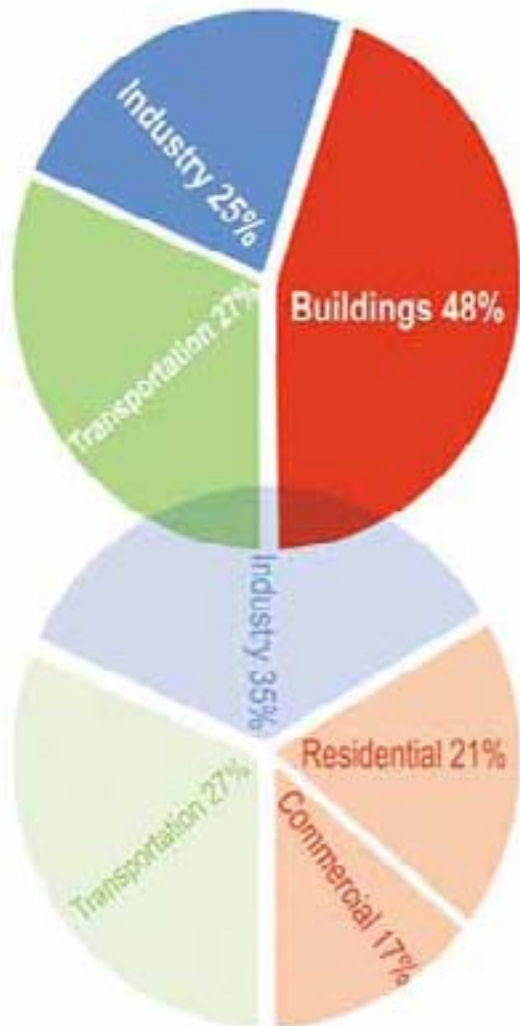
- Off-the-shelf technology
- Integration is key
- ID and eliminate market barriers



Buildings Have BIG Impact



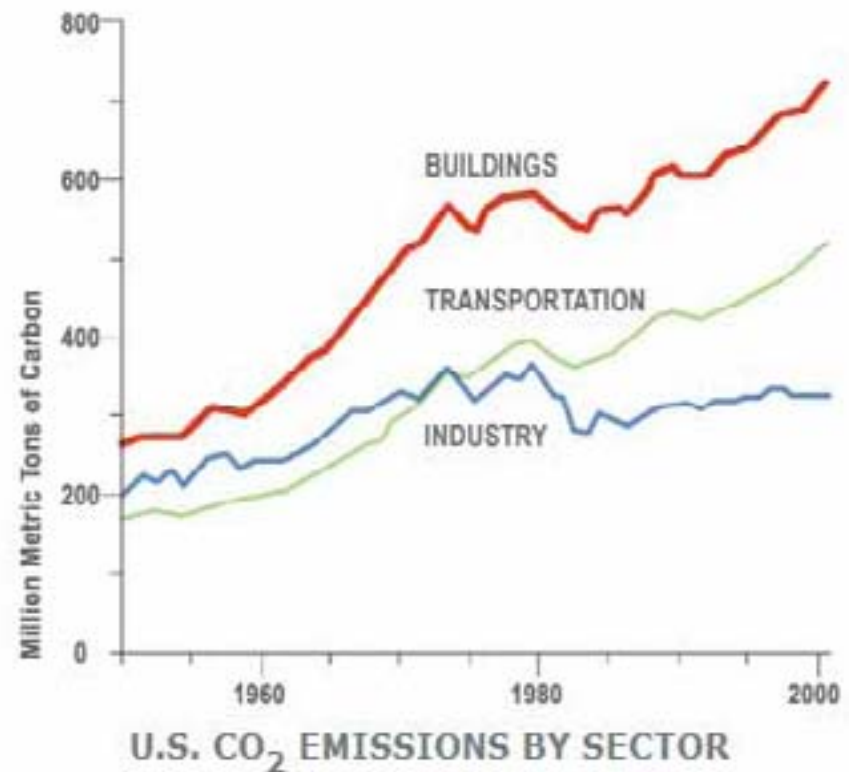
- Use 30-40% of total US energy
- 60-70% of electricity
- 35-40% of municipal solid waste
- 25-30% of wood & raw materials use
- 25% of water use



U.S. ENERGY CONSUMPTION
BY SECTOR

Source:
U.S. Energy Information Administration
statistics

Combining the annual energy required to operate residential, commercial, and industrial buildings along with the embodied energy of industry produced building materials like carpet, tile, glass, and concrete exposes buildings as the largest energy consuming and greenhouse gas emitting sector.



U.S. CO₂ EMISSIONS BY SECTOR

“Unknowingly, the architecture and building community is responsible for almost half of all U.S. greenhouse gas emissions annually. Globally the percentage is even greater.”

- Guidelines
- Training
- Technical assistance
- 3rd party verification
- Marketing
- Financial incentives

Georgia
South Carolina
Virginia
Tennessee
Alabama



A new concept in home construction that's naturally better.

Participating EarthCraft Builders

| | |
|--------------------------------------|----------------|
| Aqua Homes, Inc. | (770) 443-8188 |
| Atlantic Property Development Corp. | (770) 908-2210 |
| B.C. Perry & Associates, Inc. | (678) 474-0580 |
| BBC Builders, Inc. | (770) 914-8730 |
| Beckham Custom Homes | (770) 436-2708 |
| Beckham Builders, LLC | (678) 446-4435 |
| Berkel, LLC | (847) 503-5418 |
| Bethany Construction West, Co., Inc. | (770) 445-8181 |
| Brown, Inc. | (770) 988-8620 |
| Brubaker Builders, Inc. | (404) 870-0907 |
| Brick Builders | (404) 320-7118 |
| Building Partners, Inc. | (770) 383-5483 |
| Burman Builders, L.P. | (678) 429-9128 |
| C & J Associates, Inc. | (708) 445-2958 |
| Cardell Properties, Inc. | (770) 877-8480 |
| Carriage Homes, Inc. | (770) 479-9148 |
| Champion Enterprises, Inc. | (888) 335-6437 |
| Chatham Homes, Inc. | (678) 424-2900 |
| Cheryl Custom Homes, Inc. | (770) 404-0847 |
| Cliff Pointe Properties, LLC | (770) 481-1990 |
| Collier & Collier, Inc. | (678) 378-5851 |
| Cox Homes, Inc. | (770) 898-0900 |
| Crown Pointe Homes, Inc. | (678) 408-0111 |
| D.C. Woodley & Associates, Inc. | (404) 304-9124 |
| D.B. Hixon - Terry Homes | (770) 421-8111 |
| Dan Collier Homes, LLC | (678) 443-0101 |
| David Orlinsky Homes | (404) 352-1345 |
| Discovery Technology, Inc. | (770) 429-2887 |
| Dorsey Bank Homes, Inc. | (678) 354-8333 |
| Doug Warner Homes, LLC | (770) 404-1283 |
| Elegant Properties | (770) 404-0845 |
| Emmett Homes, Inc. | (770) 513-1111 |
| Evans Construction, LLC | (770) 888-8100 |
| F. L. Lutz, Inc. | (770) 442-5327 |
| G.F. Properties, Inc. | (770) 445-1140 |
| Hart Builders, Inc. | (678) 328-2378 |
| Haven Properties, Inc. | (770) 818-8888 |
| Haystack Design/Build, Inc. | (770) 992-4744 |
| Health & Community Enterprises | (678) 430-2948 |
| Hopwood Properties, Inc. | (770) 880-2887 |
| Howard Wilkins Homes, Inc. | (770) 479-4111 |
| Howard Legacy | (770) 438-0834 |
| Hunter Blair Homes, Inc. | (770) 370-2141 |
| Joe Hagan Homes, Inc. | (770) 445-9120 |
| John Wilford Homes, Inc. | (770) 914-2400 |
| John Wilks Homes, Inc. | (770) 429-2499 |
| Kathleen Day & Associates | (770) 444-0100 |
| Kelly Martin Homes, Inc. | (770) 467-6174 |
| Lane Oak Builders, Inc. | (770) 988-4000 |
| McLennan Homes, Inc. | (404) 829-6162 |
| McLennan-Perry Homes | (770) 580-9888 |
| McPherson, Inc. | (678) 311-2510 |
| Monogram Homes, Inc. | (770) 429-9148 |
| Norris and Company | (770) 499-7003 |
| NSA Homes, Inc. | (770) 888-5442 |
| Orley Builders | (770) 381-2897 |
| Pete Wilkins Homes, Inc. | (770) 444-7918 |
| Phoenix Communities, Inc. | (404) 713-2636 |
| Profile Signature Homes, LLC | (770) 438-2100 |
| Residential Builders, Inc. | (770) 413-4262 |
| Richport Properties, Inc. | (770) 434-2810 |
| Ringwood Homes | (770) 429-1675 |
| Rosewood, Inc. | (770) 438-3322 |
| Rudy & Terry Brown Properties, LLC | (770) 812-8111 |
| Southern States Construction, LLC | (770) 442-0500 |
| The Wellmeyer Group, Inc. | (404) 388-8900 |
| The Builders/Plum Group, Inc. | (770) 888-6342 |
| Tom Hall Builders, Inc. | (770) 894-9116 |
| Woodhill Homes, LLC | (770) 711-8360 |
| Woodward Homes, Inc. | (770) 448-2116 |
| Woods Builders, Inc. | (404) 315-5174 |

EarthCraft House is now being offered by a select group of greater Atlanta home builders, who are specially trained to build cost effective, high performance homes that are good for you and good for the environment. The innovative new program includes third party inspections that ensure the value and comfort your family deserves.

- Lower Utility Bills
- Healthier Indoor Air
- More Durability
- Less Maintenance
- Greater Comfort

Request the book from your builder. Ask for a new EarthCraft House. Sensibly built for the environment. For a list of builders in your area contacting forces in a wide range of prices, visit EarthCraft House at www.earthcraft-house.com or call for Greater Atlanta Home Builders Association. 770-938-9900

EarthCraft Scope

- **Single-family**
new home and renovation
- **Multi-family**
new home and renovation
- **Affordable housing**
- **Communities**
- **Adapted by other locales**



Westbrook EarthCraft House

- DOE Building America and Zero Energy Homes programs
- EarthCraft House™ and ENERGY STAR® certified



Carter Woods

Richmond Better Housing Coalition

- 154-unit elderly, Federal Low Income Housing Tax Credit Project
- EarthCraft House features added less than 1.5% to cost
- Green Features include:
 - Energy Star Rating
 - airtight ducts and envelope
 - fibrous cement siding
 - blown cellulose insulation
 - low-e windows
 - low flow water features



The Eco Office Overview

- 10,000 sf offices & training space
- Green Building Showcase
- 75% water use reduction
- Capture 2-year storm
- 60% energy use reduction
- Tracking LEED-Platinum



Image courtesy of Lord, Aeck, and Sargent Architects



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Responsible Solutions for Environmental Living

Water Technologies



ACF Environmental rain tank

- Efficient fixtures
- Composting system
- Rainwater harvest
- Porous paving
- Green roof
- Rain gardens
- Water-efficient landscaping

Site Demand Reduction – Green Roof Vegetation



- Mulched planting beds

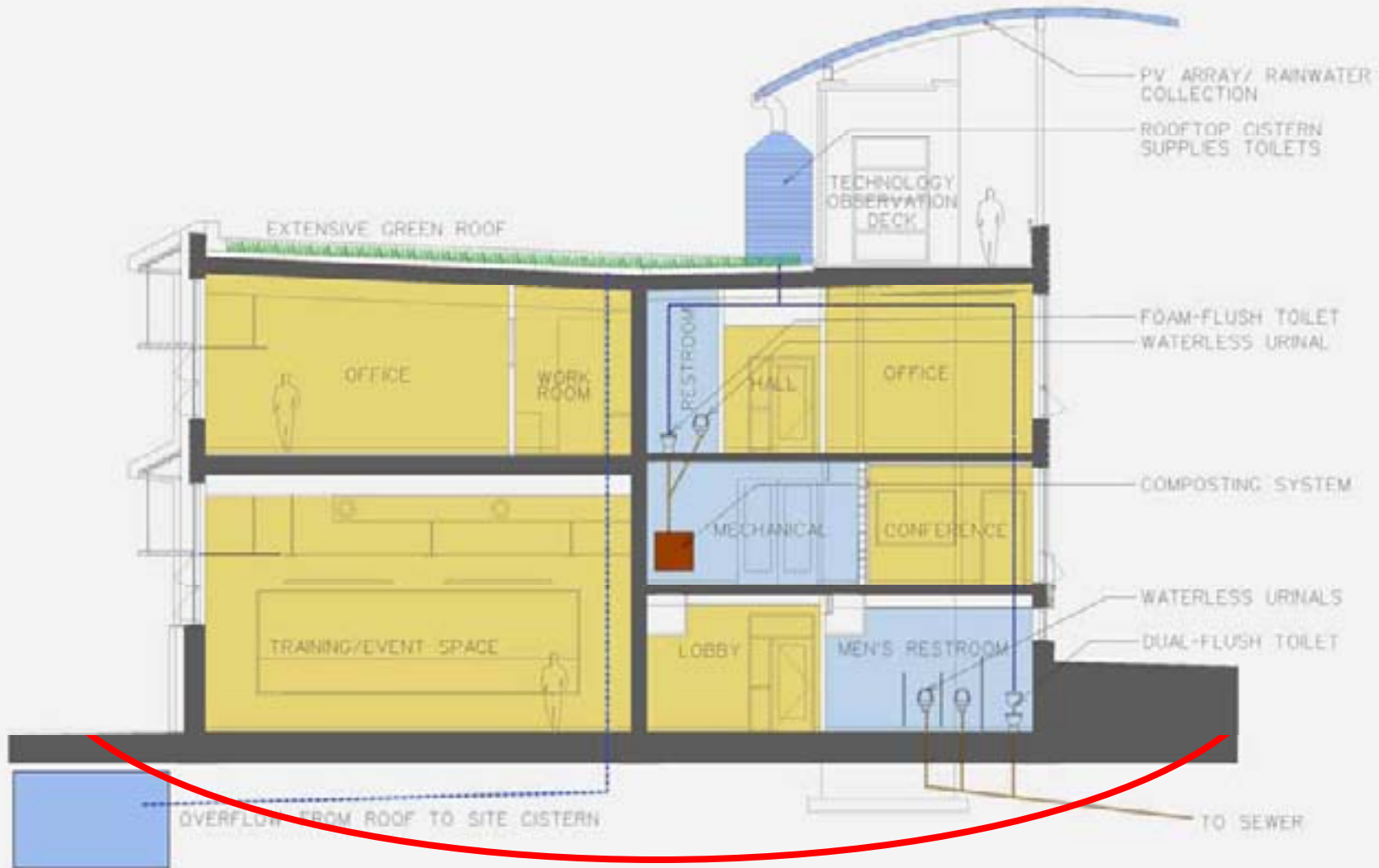
Site Demand Reduction – Rain Garden



Images courtesy Ecos Environmental Design

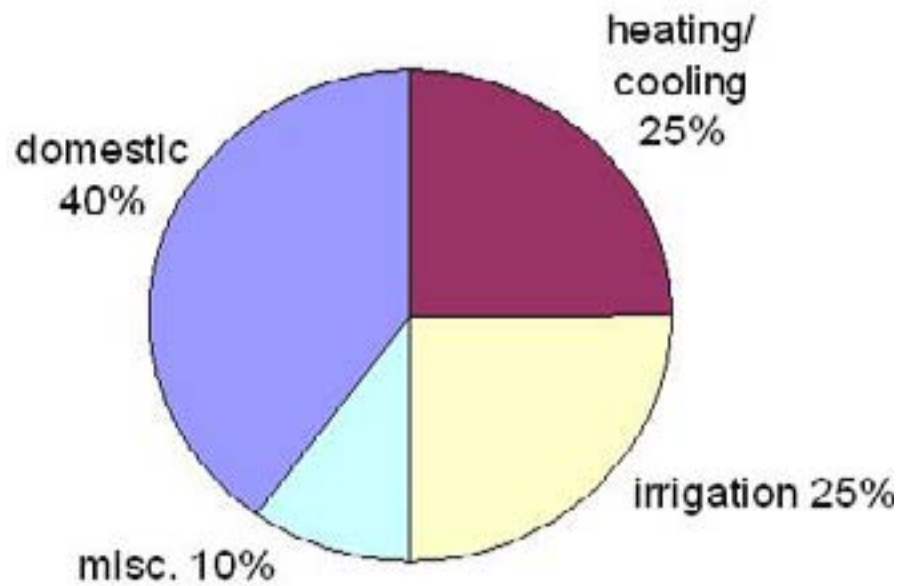
Rain gardens minimize storm water runoff

Eco Office Plumbing Diagram

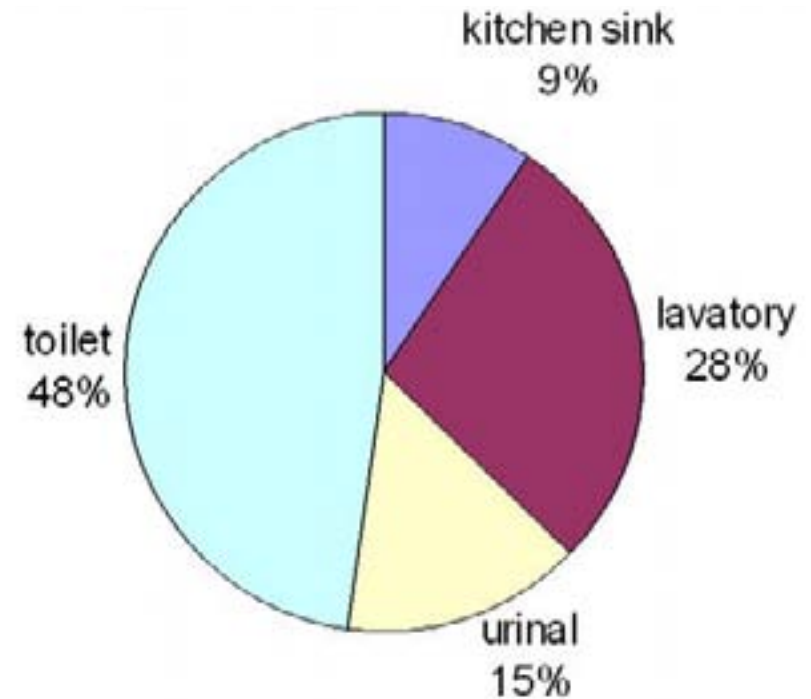


Public Level - 100 occupants

Commercial Office Water Use



Domestic Water Use



Toilets



- Conventional 1.6 GPF
- 60,000 gallons / year



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Responsible Solutions for Environmental Living

Toilets



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Responsible Solutions for Environmental Living

Dual-Flush Toilet

Lower level toilets

- Caroma USA, *Caravelle*
- Standard plumbing
- 1.6gpf / 0.8 gpf
- 100 occupants
- Savings – 20,000 gal/year



Waterless Urinal

Lower level urinals

- Sloan Valve Company, *Waterfree*
- No supply / flush valve
- 0.0 gpf
- 100 occupants (50%)
- Savings – 25,000 gal/year



Image courtesy Sloan Valve Company

Foam-Flush Composting Toilet

Upper level toilets

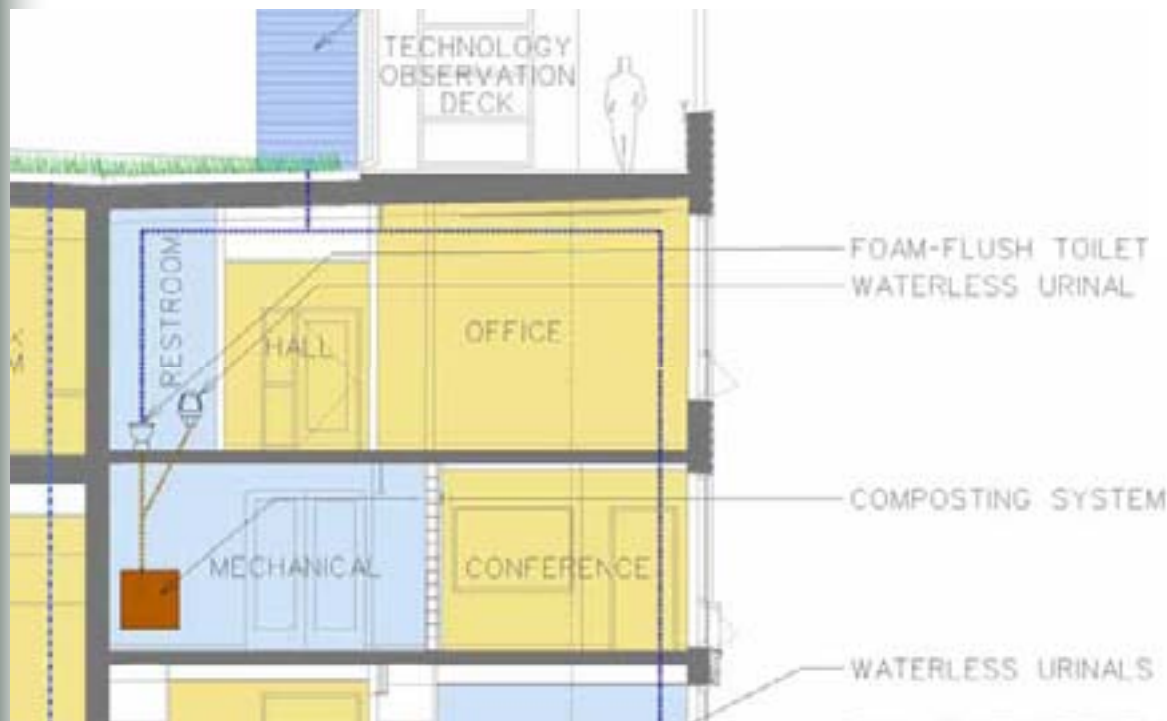
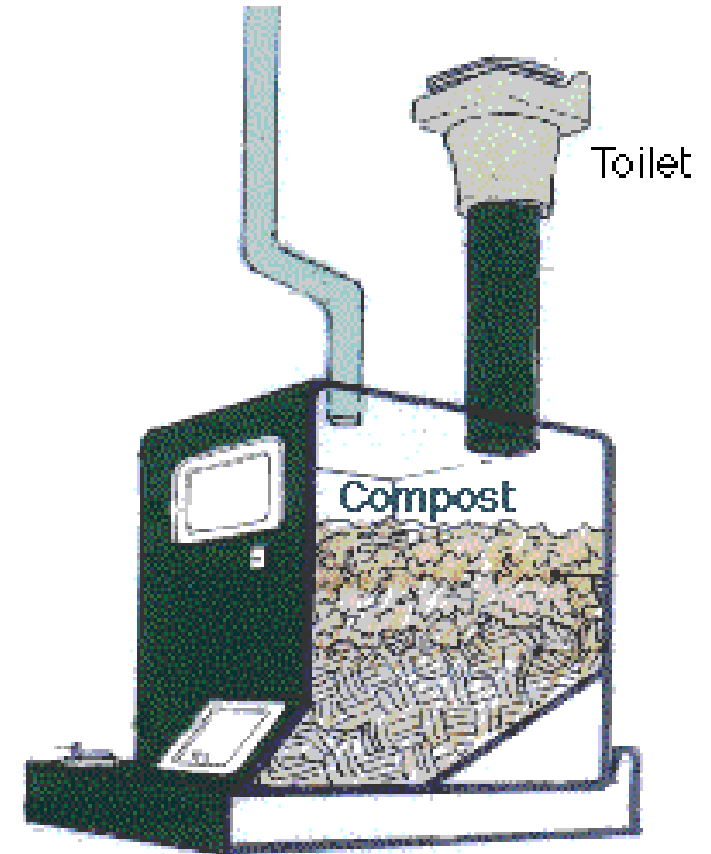
- Clivus Multrum
- 4" waste line eliminates Black Hole
- Water/biodegradable soap
- 6 oz. per flush (3%)
- 20 occupants
- Savings – 20,531 gal/year



Image courtesy of Clivus Multrum

Compost Bin and Tank

- 110 flushes/day peak
- Compost once / year
- Compost tea 4 gallons/day
- Tea once / month



Source: E Source 1997

Low-flow, Automatic Faucet

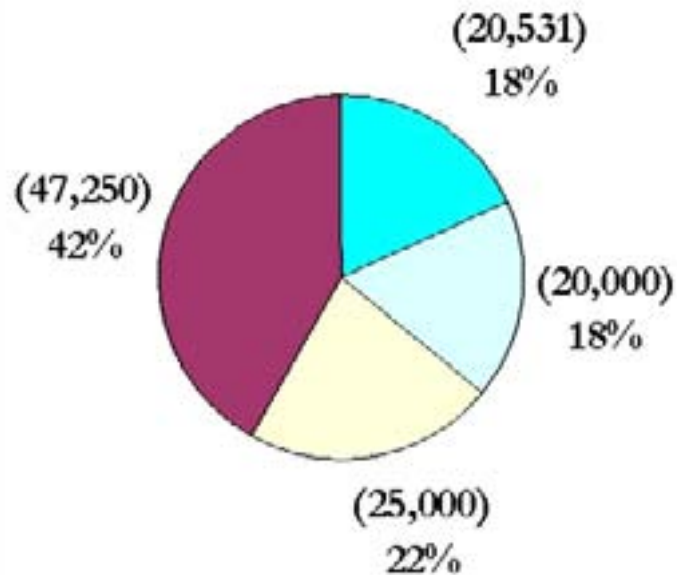
All lavatories for public & staff

- Conventional faucet 2.5 gpm
- Sloan Valve Company, *Solis*
- 0.5 gpm, PV recharge
- Savings – 47,250 gal/year
- 42% of total demand reduction



Image courtesy of Sloan Valve Company

Annual Water Use Reduction

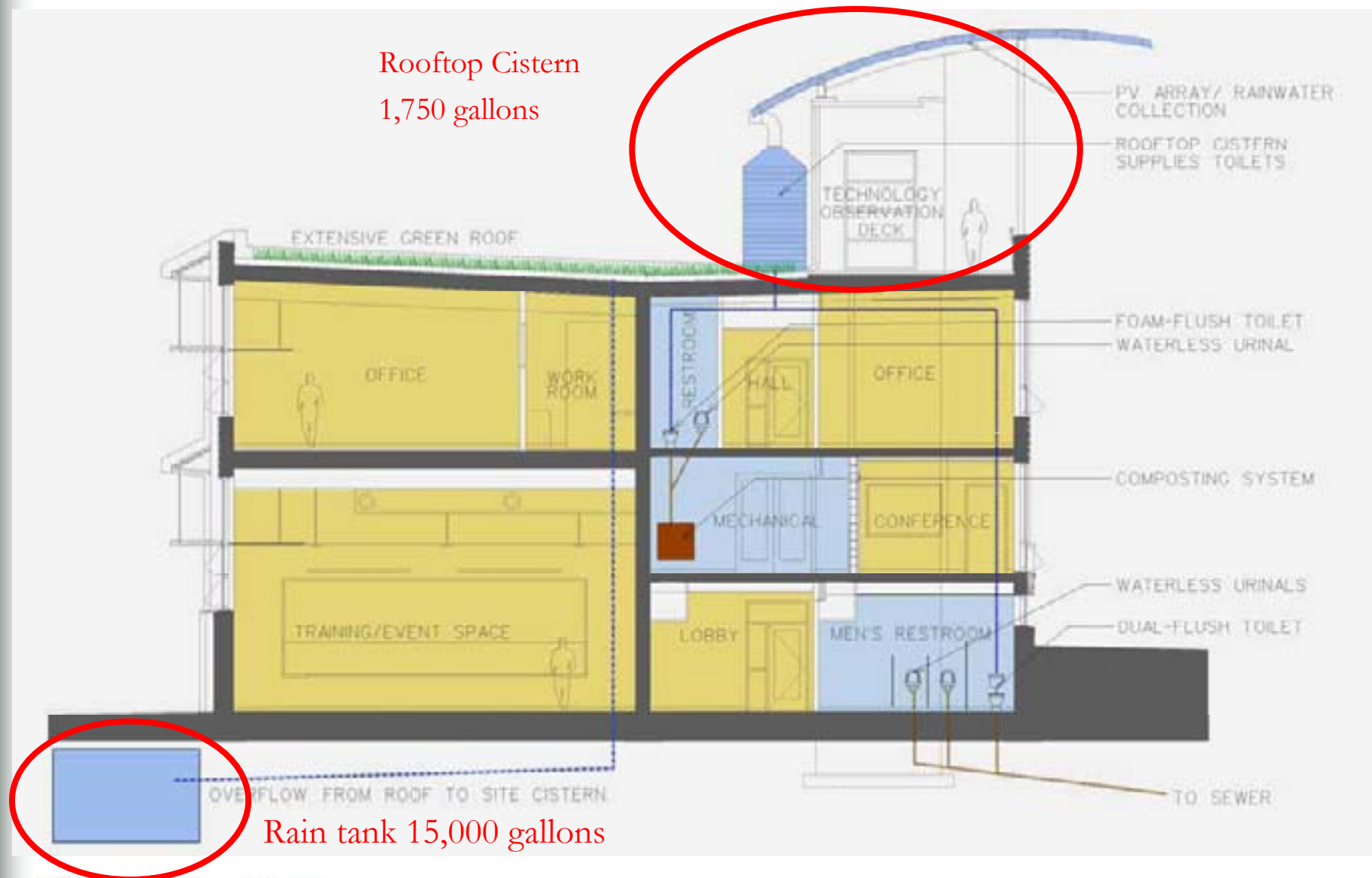


- Foam-Flush Savings
- Dual-Flush Savings
- Waterless Urinal Savings
- Low-Flow Lavatory Savings

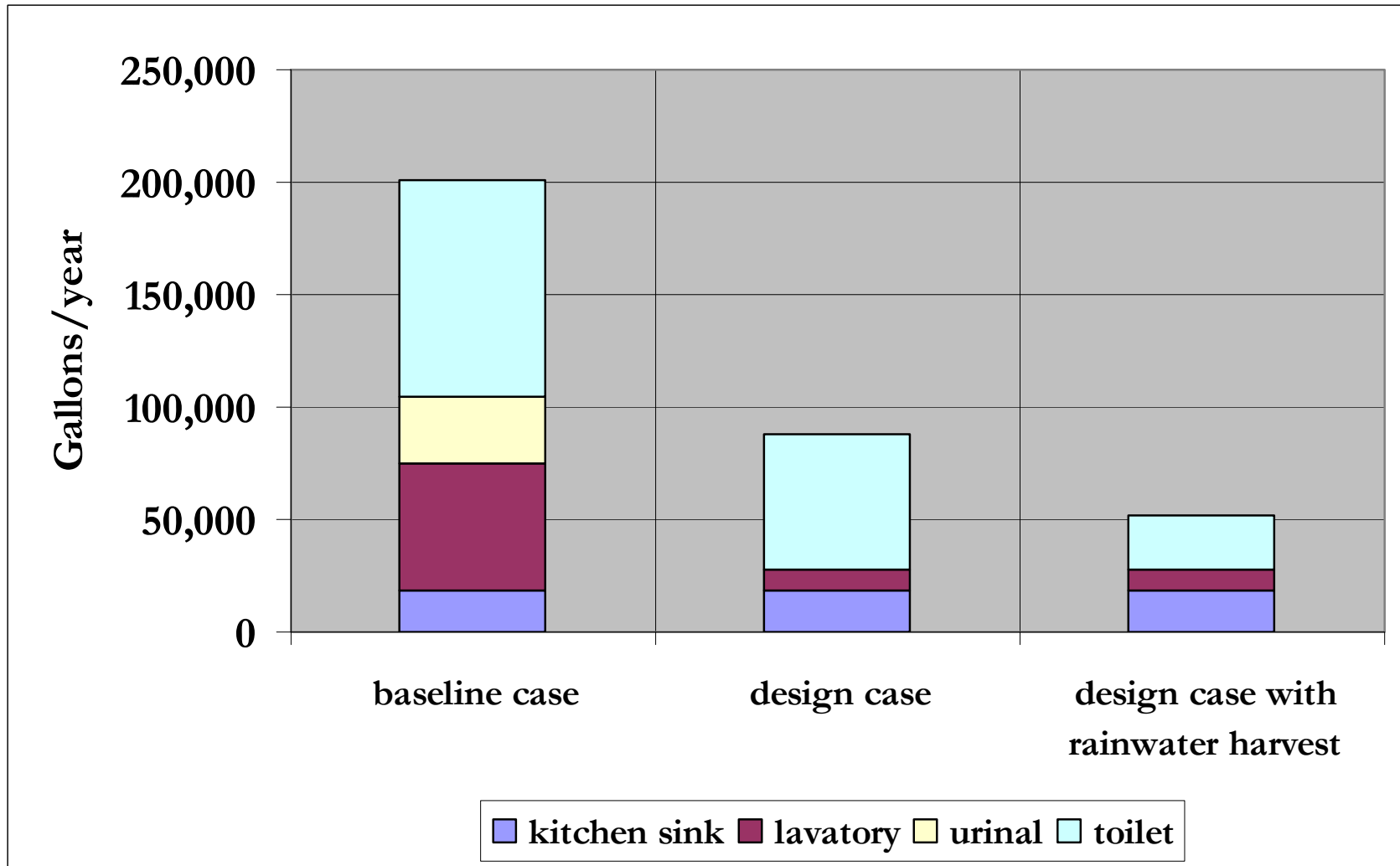
Summary

- Base Case – 201,000 gal/year
- Design Case – 88,219 gal/year
- Reduction – 112,781 gal/year
- 56% Reduction





Water Use Reduction Results



LEED Water Results – 6 to 7 points

- WE 1 – Water Efficient Landscaping
 - No potable water for irrigation
 - 2 points
- WE 2 – Innovative Wastewater Technologies
 - 80% reduction (*52% without rooftop cistern*)
 - 1 point
- WE 3 – Water Use Reduction
 - 74% reduction
 - 2 points
- ID 1 – Innovation in Design
 - Exemplary Water Use Reduction (WE 3) – 1 point
 - *Possible* Exemplary Innovative Wastewater (WE 2) – 1 point

Water and Electricity

- Potable water requires vast amounts of energy for purification and delivery; waste treatment requires energy
- Power generation utilizes large quantities of fresh water creating thermal pollution and consumptive loss



Water conservation = Energy conservation

Energy conservation = Water conservation

Electricity and Water

3 gallons of water are used to
produce each kilowatt-hour

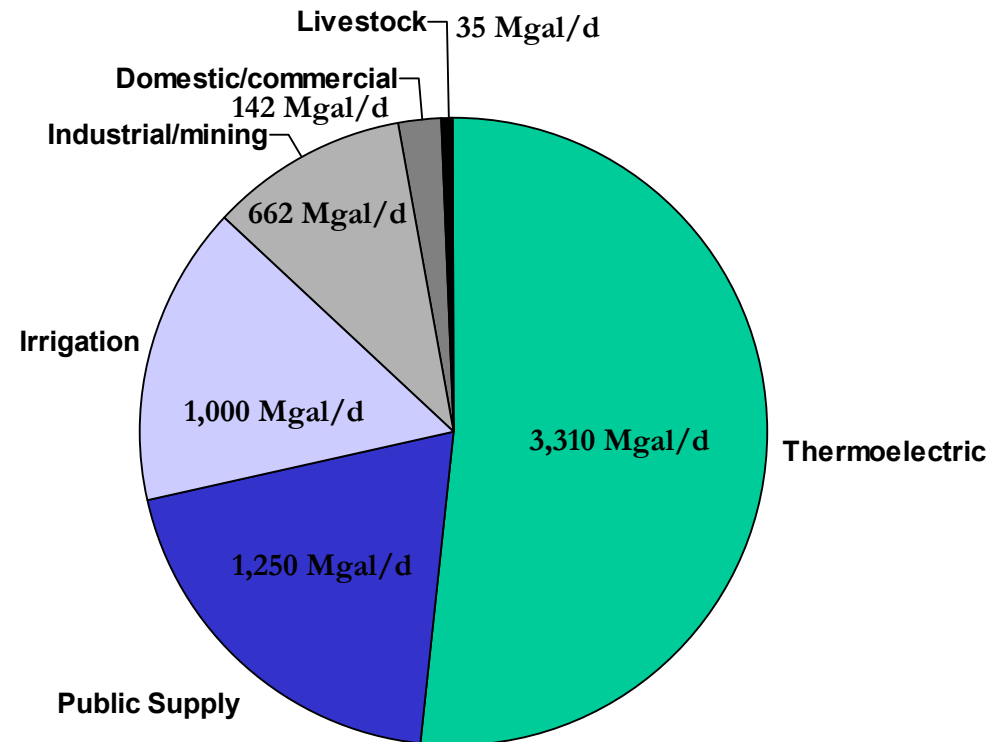
Source: Southern States Energy Board

Base Case Electricity =
144,094 kWh

→ 432,282 gallons/year

Eco Office Electricity =
64,804 kWh

→ 194,412 gallons/year

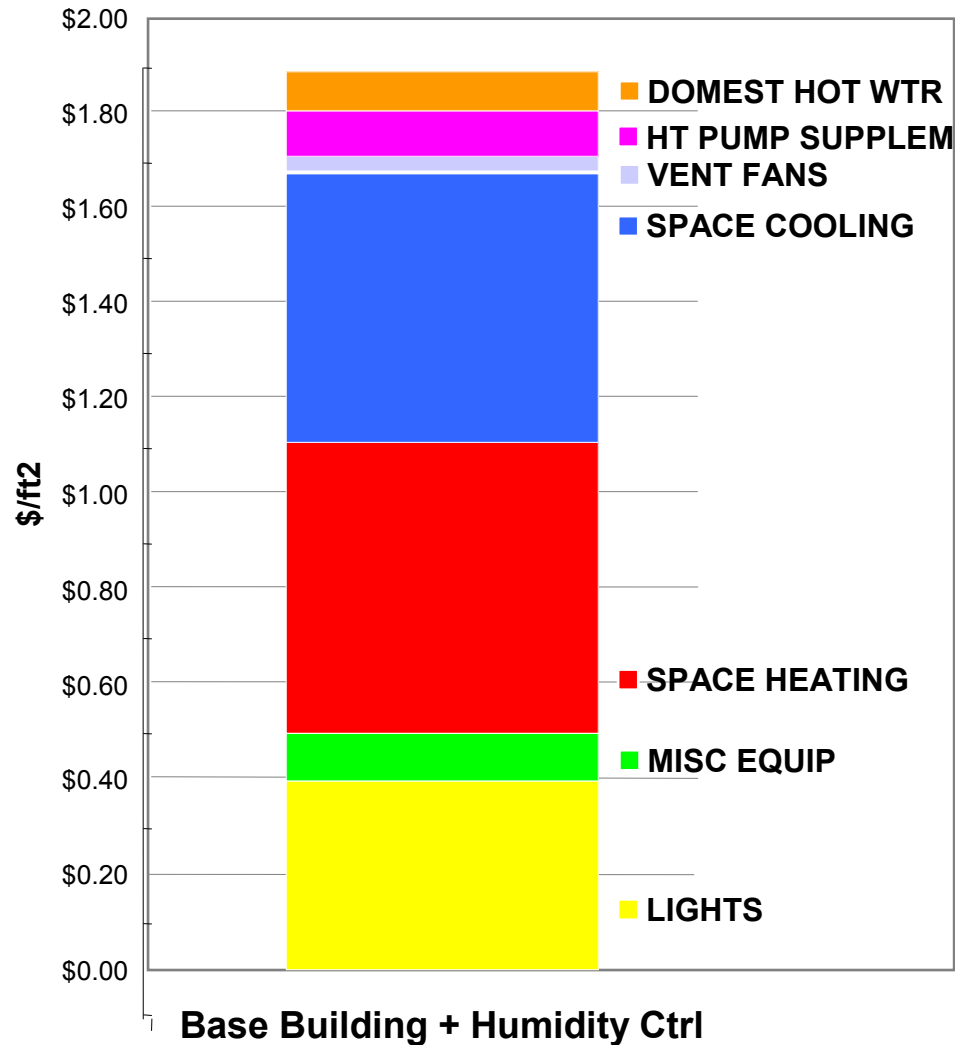


Georgia Total water use-
6,490 million gallons per day (Mgal/d)

Energy Strategy

- Examine Base Building
- Reduce Loads
- Meet Remaining Loads Efficiently
- Green Energy Supply

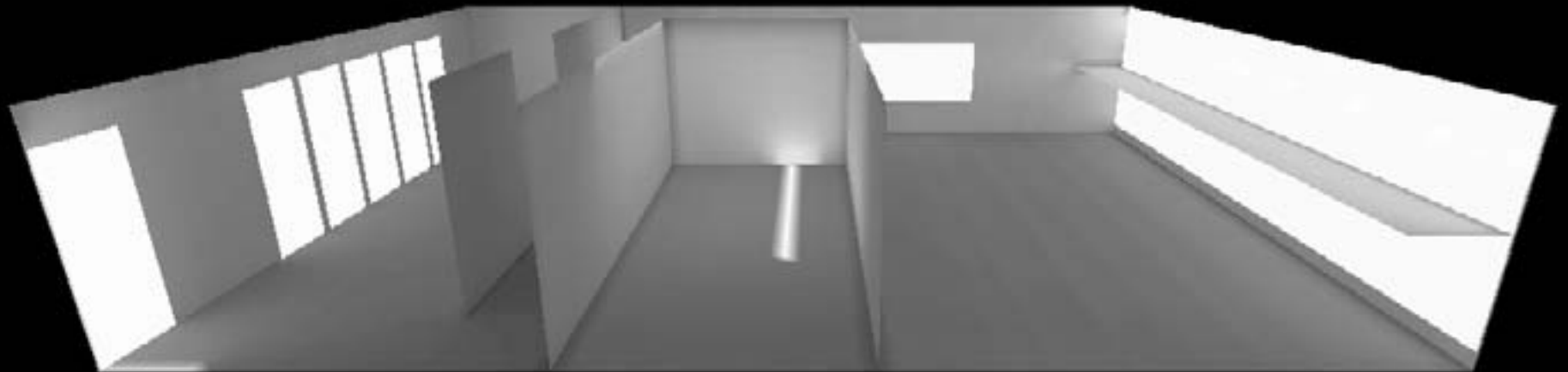
Heating & Cooling Load Components Base Building



Priorities

- Lighting
- Moisture removal
- Space conditioning

Daylight Modeling



June 21st

Lumen Micro Simulation



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Responsible Solutions for Environmental Living

Optimizing South Facade

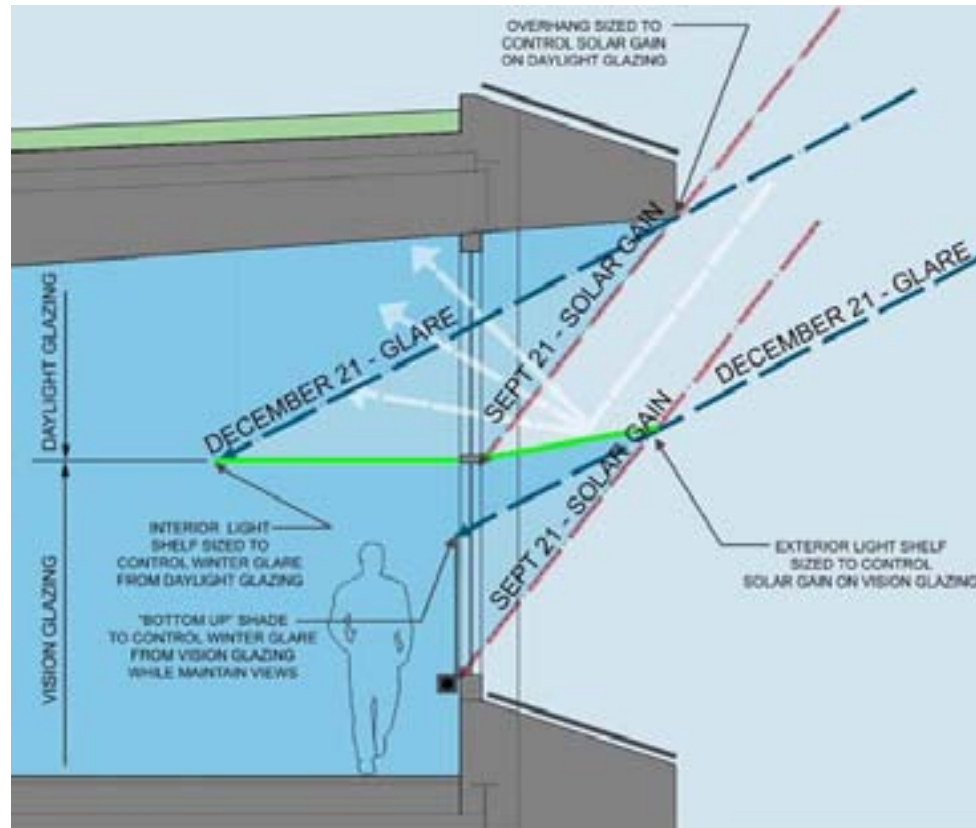


Image courtesy of Lord, Aeck and Sargent

94% of glazing is located on north and south, maximizing daylight while restricting solar heat gain in warmer months

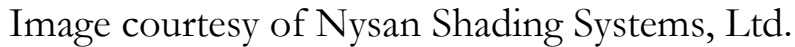
Nysan Shading Devices



Image courtesy of Nysan Shading Systems, Ltd.

- External shade blinds
- Roof-mounted anemometer signals blinds to close in high winds

100



- Southface**
Responsible Solutions for Environmental Living

Epic Metals Roof Deck System

- Long spans (50ft) reduce framing
- Acoustic and aesthetic qualities eliminate need for ceiling finishes
- Can be fabricated from 100% recycled steel
- Ribbed panels allow for Solatube Skylights without need for framing
- Light color reflects daylight



EPIC Metals Corporation

Artificial Lighting

- Integrated automatic controls allowing artificial lighting to dim and brighten to balance daylight
- Lights organized in separate bays for precision control
- Efficient florescent lighting technology with anti-glare design
- Excellent color rendering
- Occupancy sensors

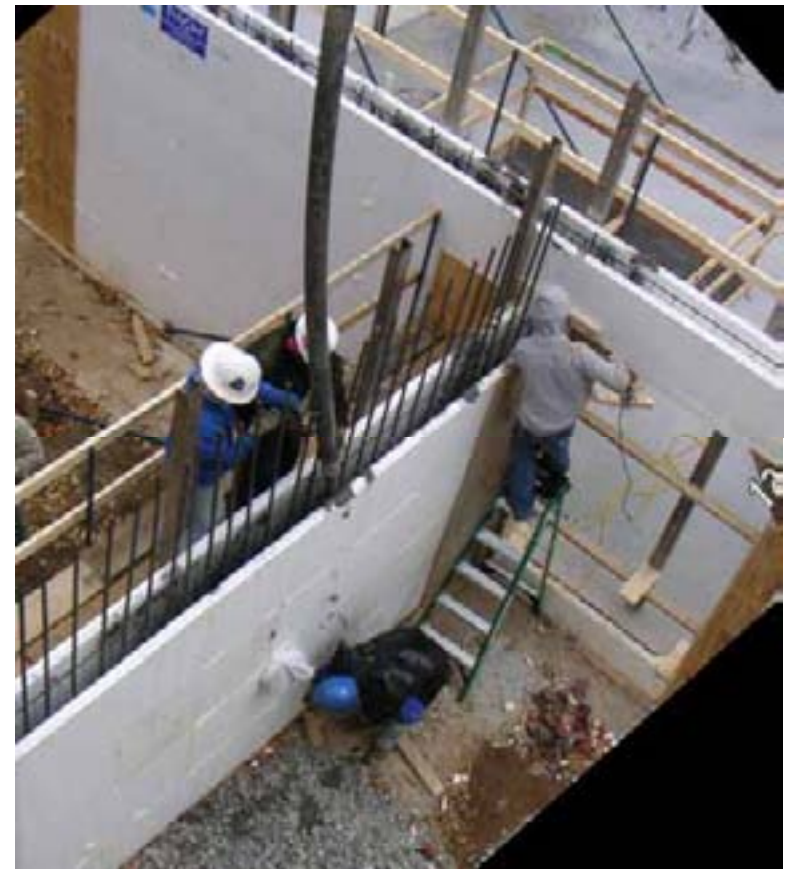


Acuity Brands Lighting

Building Envelope

Continuous Air, Thermal and Moisture Barriers

- Polysteel Insulated Concrete Forms (ICF)
- 40% recycled fly ash and slag content of concrete
- ICF is resource efficient and reduces waste
- Cost effective alternative to light gauge steel



Hi-performance Glazing

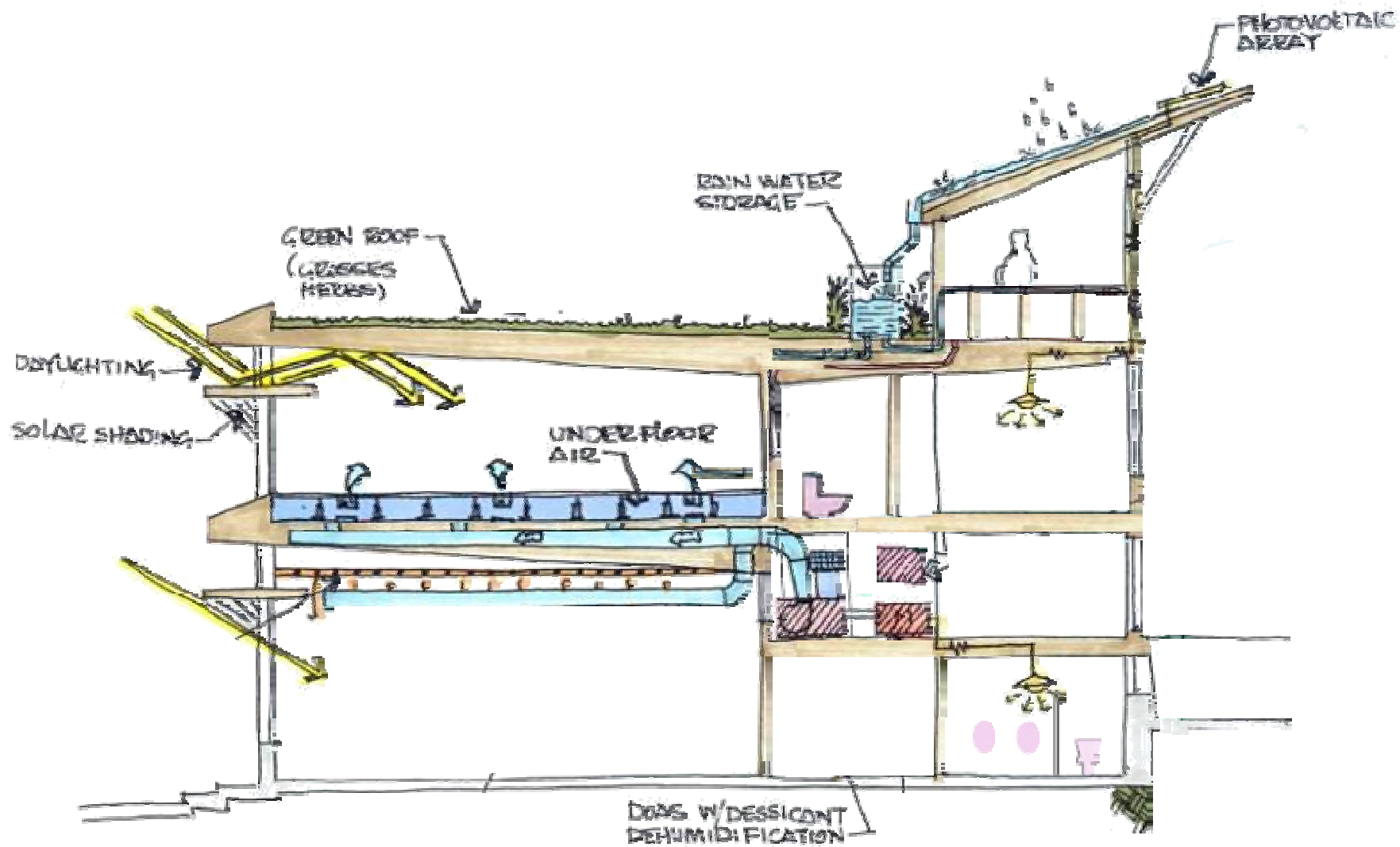
- Operable, wood frame, aluminum clad windows
- Low-E glazing
- View glazing and daylight glazing on south
- Limited glazing on east and west
- Electro-chromatic glazing on east
- Solatubes



Mechanical Systems- Highlights

- Optimized Heat Pumps
- Dedicated Outside Air System (DOAS)
- Displacement Ventilation
- Fabric Ducts
- Integrated System





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Responsible Solutions for Environmental Living

Optimized Heat Pumps

- High efficiency, dual speed Carrier air-to-air heat pumps (SEER 16)
- Harvested rainwater sprayed on EcoMesh cage enhances efficiency through evaporative cooling
- Five separate zones and central mechanical room for efficient air distribution
- All ductwork in conditioned space

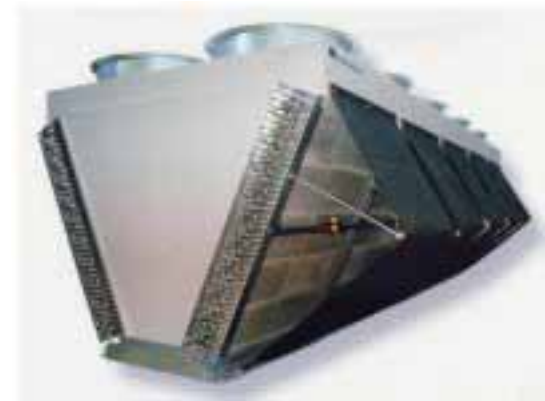


Image courtesy of *EcoMESH™*

Dedicated Outside Air System (DOAS)

Provides 100% fresh air for occupants

Decouples latent and sensible loads utilizing 3 separate energy efficient technologies:

- dew point indirect evaporative cooler (Coolerado)
- enthalpy recovery wheel (Greenheck)
- liquid desiccant dehumidification system (Drycor)

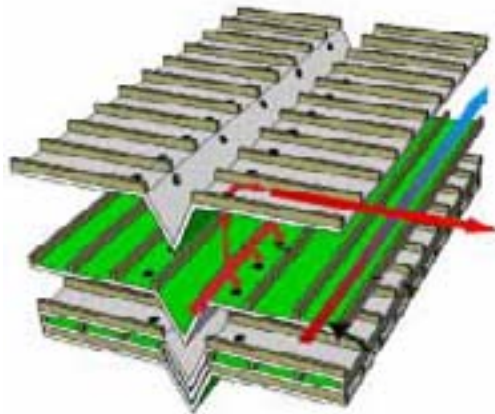


Image courtesy Coolerado Cooler



Image courtesy of Greenheck

Displacement Ventilation

- Raised floor allows for flexible workspace and easy re-wiring
- Minimizes volume of conditioned space by utilizing the stack effect, conditioning only lower air space
- Underfloor air distribution offers economic, architectural and health benefits



Underfloor Air Distribution System donated by Interface

Integrated Controls

- Johnson Control's Knowledge Based Integration provides single point of responsibility for design, delivery, warranty, and commissioning
- Integrated HVAC, fire detection, and security systems
- PEMs allow individual control of temperature, air flow, task lighting, and white noise

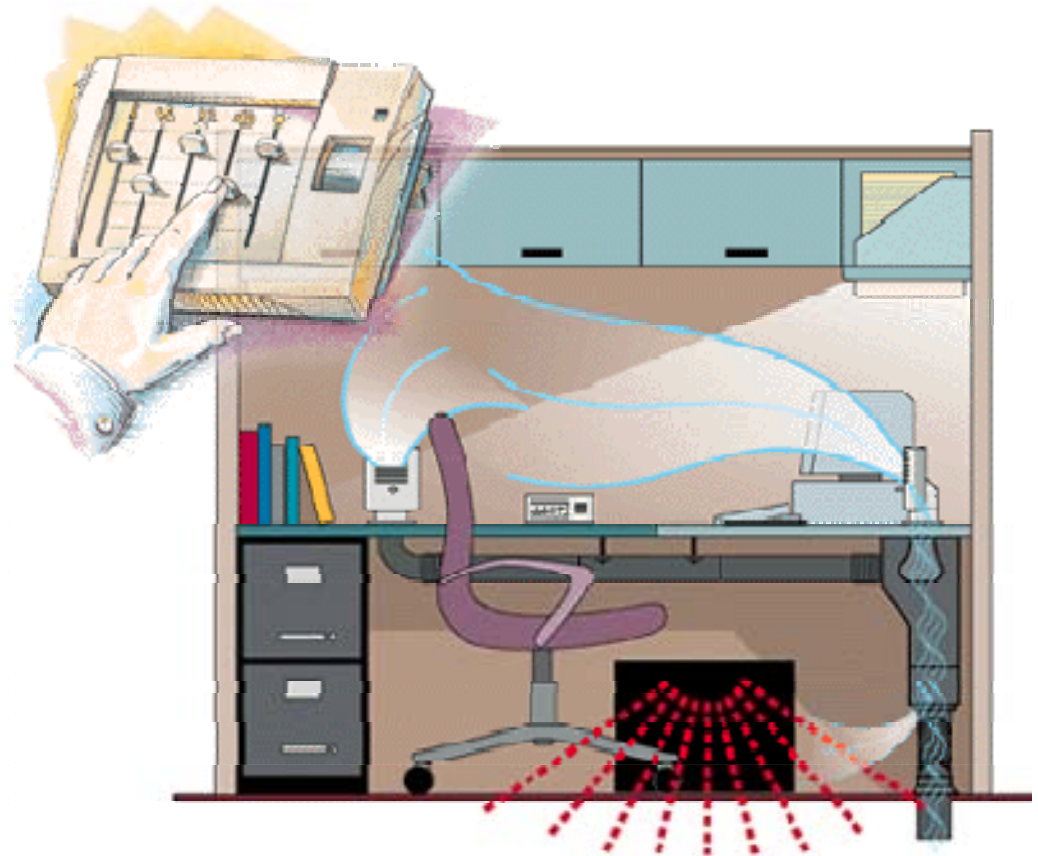


Image courtesy of Johnson Controls

Herman Miller Resolve System

- Honeycomb shaped system for open work stations
- Each module maximizes 120 radial degrees of work space
- Modular units allow for flexible office

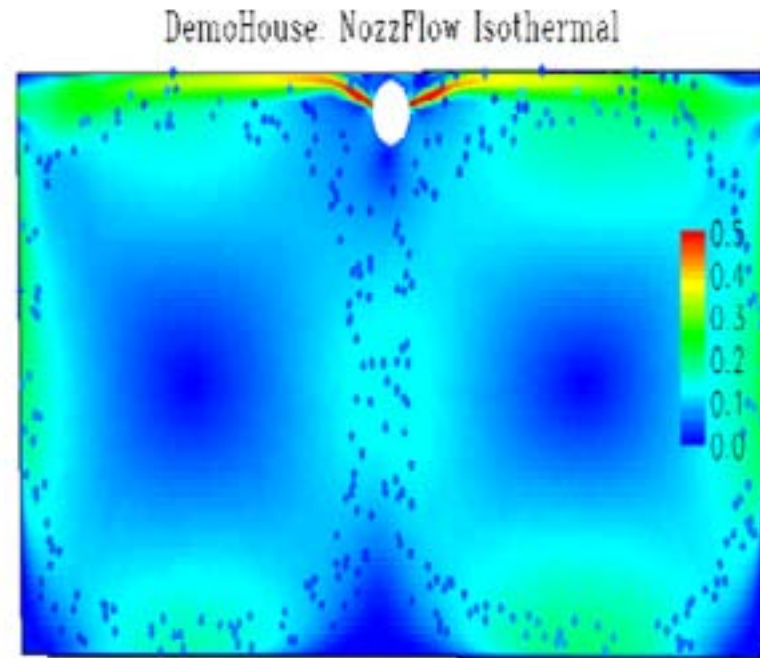


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Responsible Solutions for Environmental Living

Sustainable Materials - Fabric Duct

- Washable; improves air quality
- Permeable material reduces noise and prevents condensation
- Easier to fabricate and install than conventional metal ducts
- Engineered nozzles for precise control of airflow



www.fabricair.com

KONE EcoSpace Elevator



Compared to hydraulic elevators:

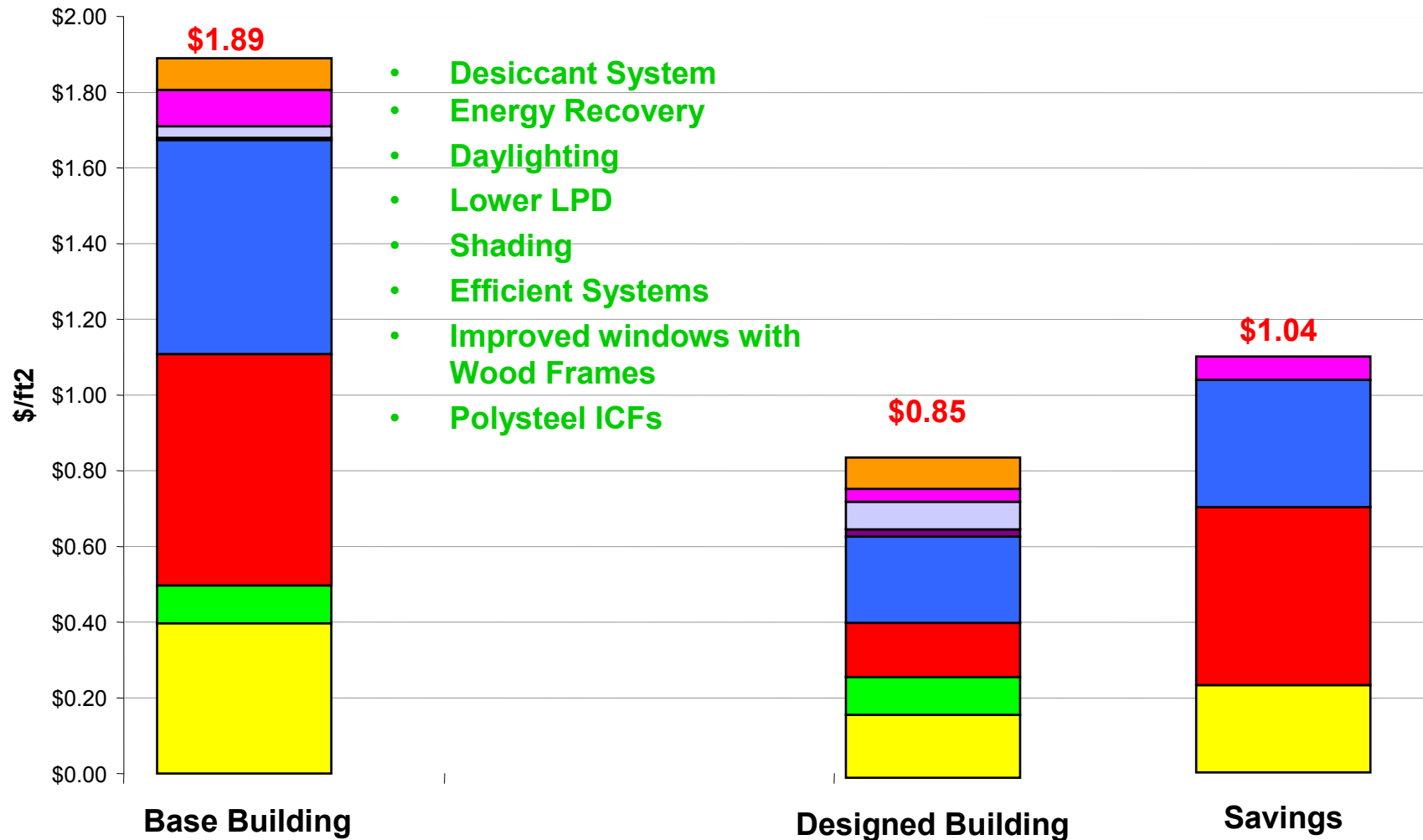
- Uses 60% less energy
- Generates 60% less heat
- Creates 30% less noise
- Uses no oil
- Requires minimal floor area (~5 s.f.) for controls



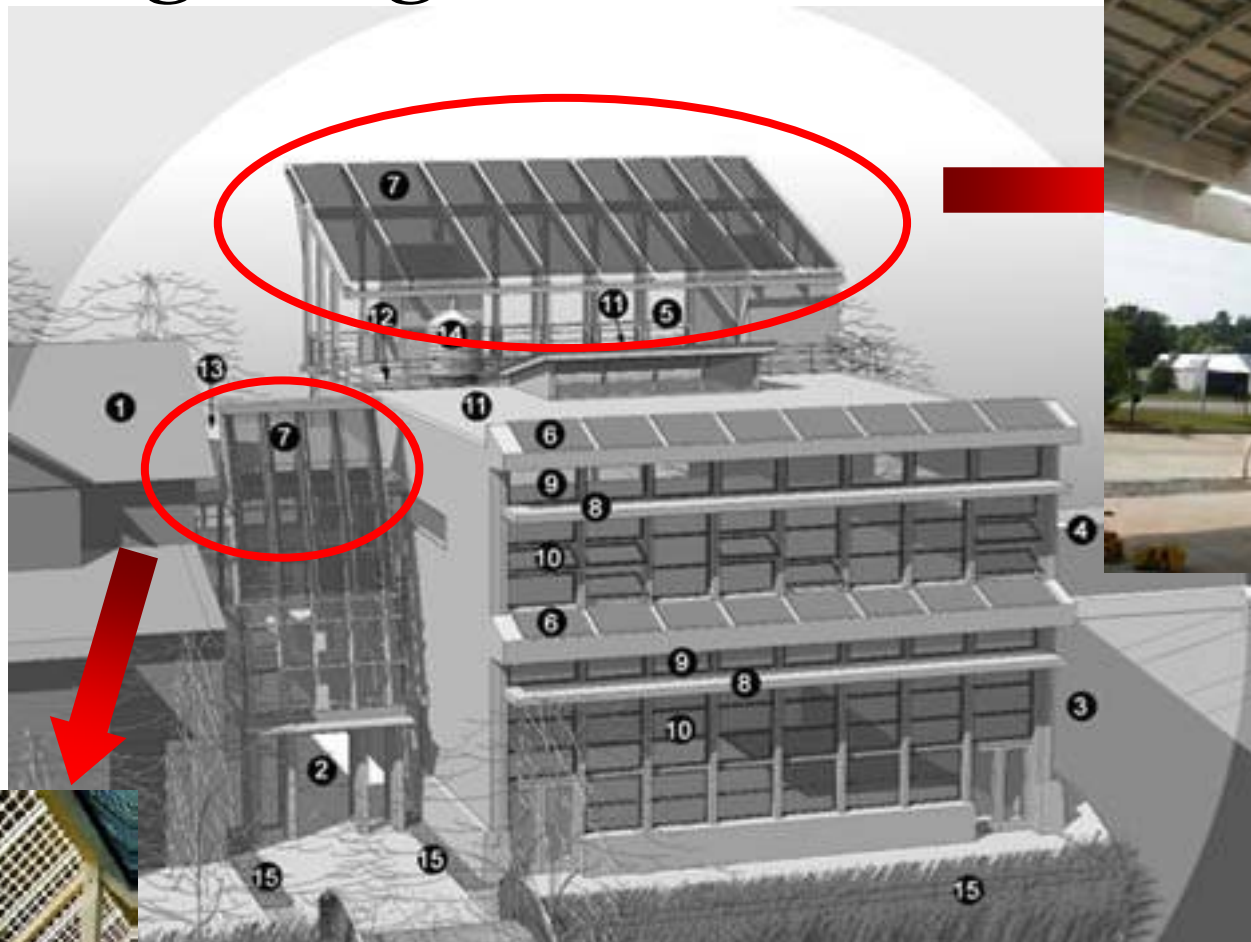
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Responsible Solutions for Environmental Living

Successful Energy Efficiency Measures

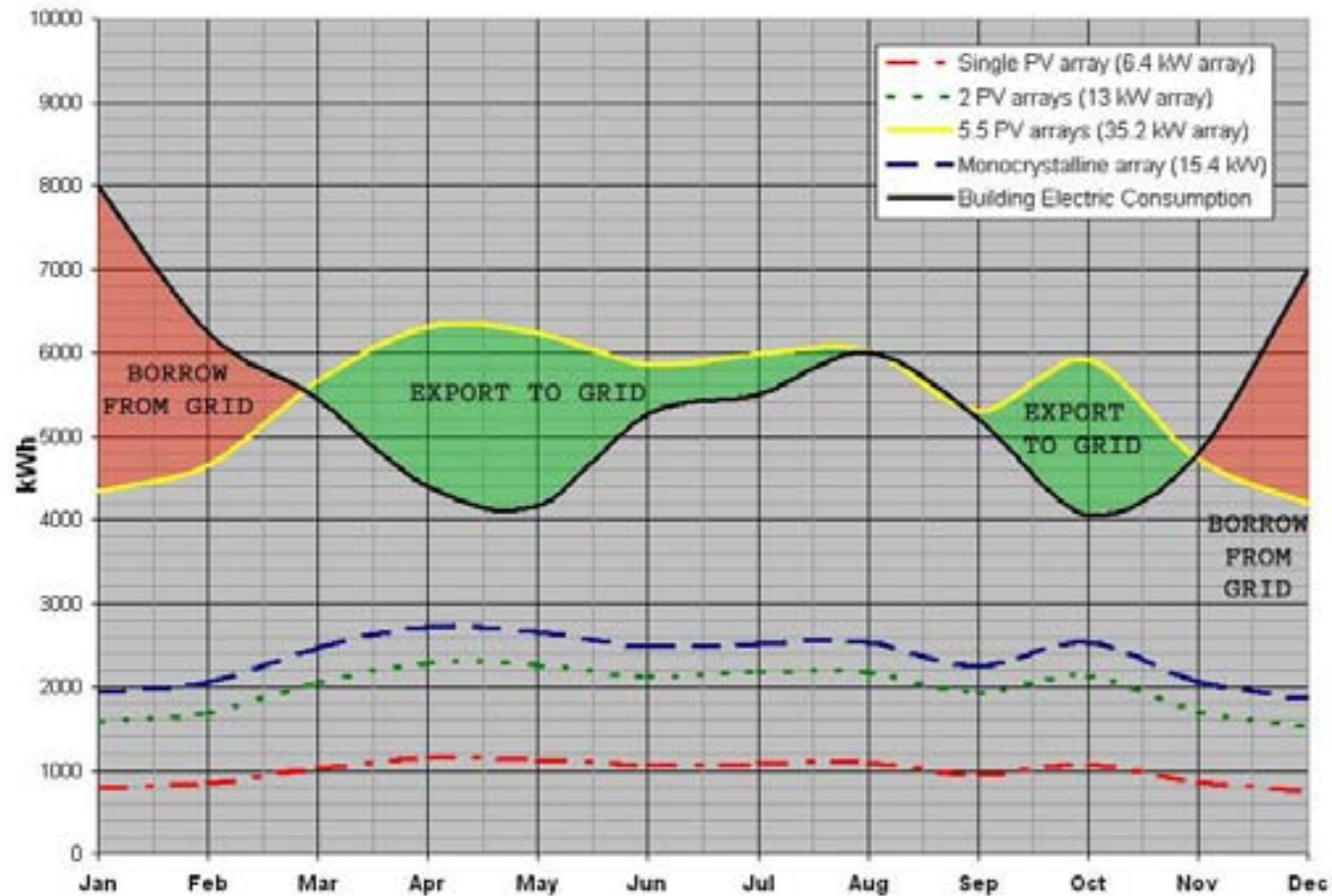


Building Integrated PV



Salvaged BP panel on Roof 6.4 kW system

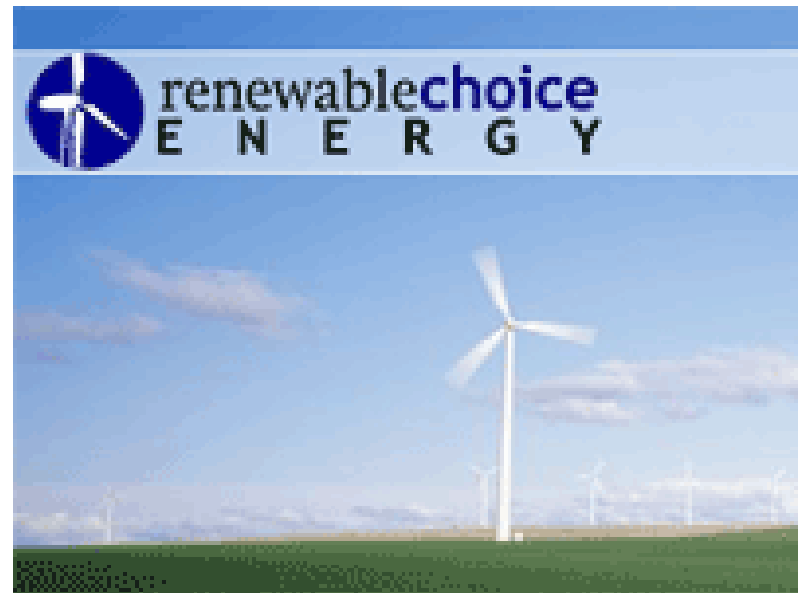
Connect Energy/Vistawall system on Atrium South Wall 1kW System



We would need to produce **5.5 times** the energy produced by the PV canopy to fill all our energy needs. The PV arrays would need to extend across our site.

Renewable Choice

- Southface is powered by 100% clean, renewable American Wind
- Our purchase of 80,000 kWh prevents 111,360 pounds of CO2 pollution
- That's the equivalent of planting 15 acres of trees

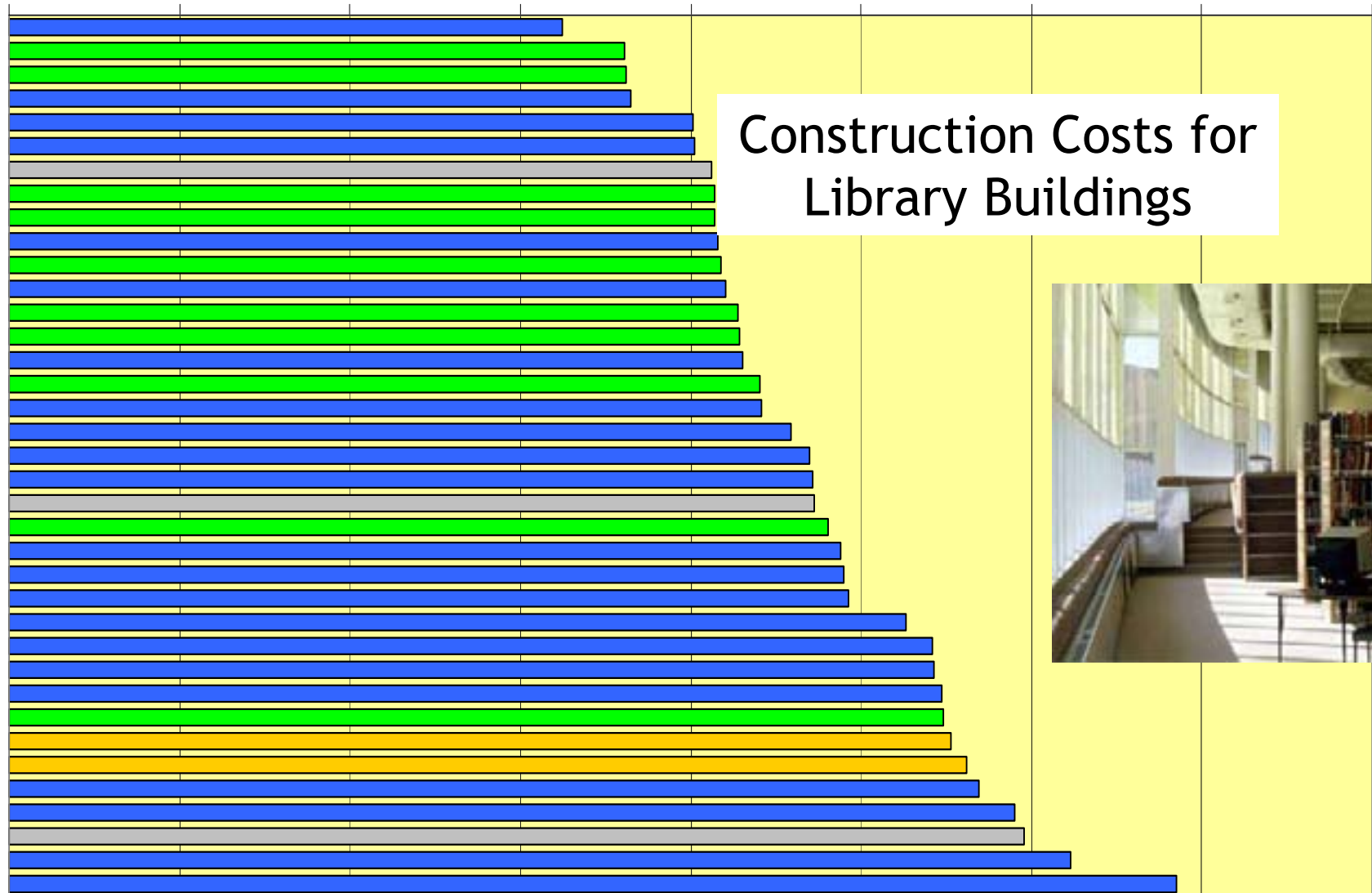


Lucid Design Group

- Real time monitoring and display of environmental performance
- Window to living building



\$0/SF \$50/SF \$100/SF \$150/SF \$200/SF \$250/SF \$300/SF \$350/SF \$400/SF



IKEA Stoughton, MA

- 350,277 square feet conditioned space
- LEED™ Certified (in process)
- The majority of parking is underneath the building, both to reduce building footprint and minimize heat gain
- 22,000 sq. ft. green roof captures and filters up to 75 percent of rooftop runoff
- Rainwater collection system holds up to 60,000 gallons of rainwater to meet irrigation needs

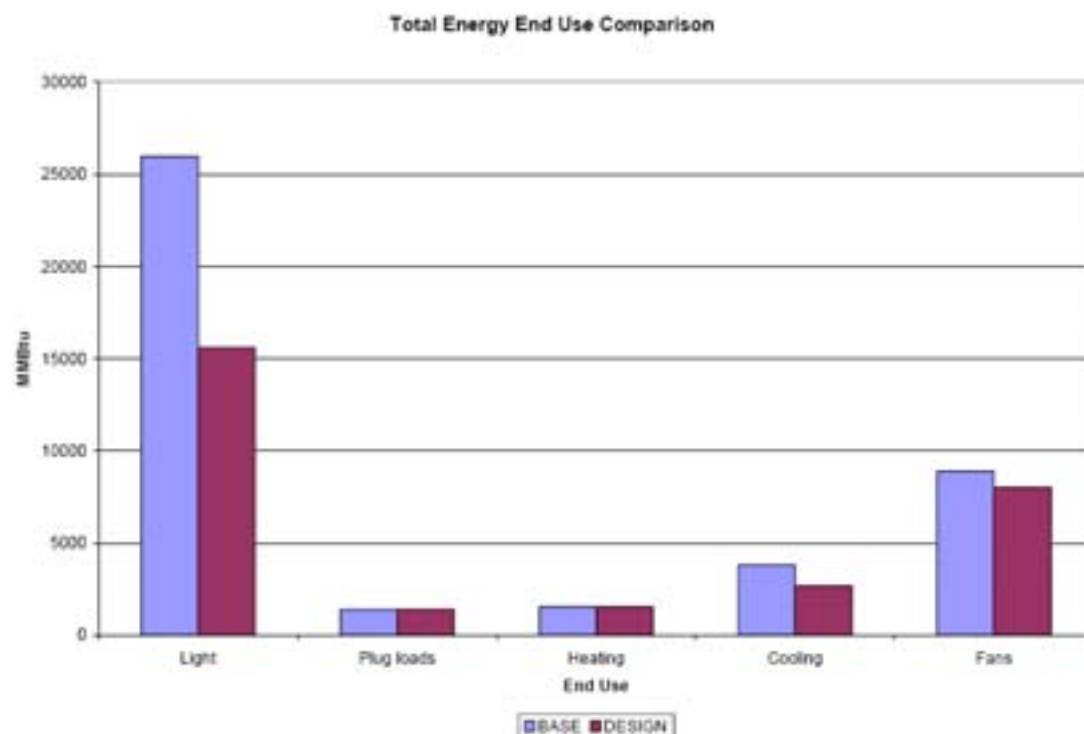


- Installed waterless urinals
- Provided showering facilities for those who bike to work
- Diverted nearly 85% of their construction waste from landfills
- Used building materials with a collective recycled content of 33%
- Utilized 86% certified wood

Using energy modelling software (VisualDOE), IKEA Stoughton was found to perform at a 38% improvement over energy code.

Energy Efficiency Measures include:

- A significantly lower lighting power density in the retail and showroom areas
- Additional Insulation in the roof and wall assemblies
- A low ratio of glazing combined with high-performance glass
- High efficiency split system package units



The 38% energy efficiency improvement resulted in a savings of \$167,000 per year.

LEED™ Scorecard

Project D9242083ELIQELF - IKEA Stoughton

31 0 37 Total Project Score

Certified 26 to 32 points Silver 33 to 36 points Gold 39 to 51 points Platinum 52 or more points

Possible Points 68

3 0 11 Sustainable Sites

Possible Points 14

| Y | T | N | Points | |
|---|---|---|--------|--|
| Y | | | 0 | Prereq 1 Erosion & Sedimentation Control |
| | | 1 | 1 | Credit 1 Site Selection |
| | | 1 | 1 | Credit 2 Urban Redevelopment |
| | | 1 | 1 | Credit 3 Brownfield Redevelopment |
| | | 1 | 1 | Credit 4.1 Alternative Transportation, Public Transportation Access |
| 1 | | | 1 | Credit 4.2 Alternative Transportation, Bicycle Storage & Changing Rooms |
| | | 1 | 1 | Credit 4.3 Alternative Transportation, Alternative Fuel Refueling Stations |
| | | 1 | 1 | Credit 4.4 Alternative Transportation, Parking Capacity |
| | | 1 | 1 | Credit 5.1 Reduced Site Disturbance, Protect or Restore Open Space |
| | | 1 | 1 | Credit 5.2 Reduced Site Disturbance, Development Footprint |
| | | 1 | 1 | Credit 5.3 Stormwater Management, Rate and Quantity |
| | | 1 | 1 | Credit 5.4 Stormwater Management, Treatment |
| 1 | | | 1 | Credit 7.1 Landscape & Exterior Design to Reduce Heat Islands, Non Roof |
| 1 | | | 1 | Credit 7.2 Landscape & Exterior Design to Reduce Heat Islands, Roof |
| | | 1 | 1 | Credit 8 Light Pollution Reduction |

4 0 1 Water Efficiency

Possible Points 5

| Y | T | N | Points | |
|---|---|---|--------|---|
| 1 | | | 1 | Credit 1.1 Water Efficient Landscaping, Reduce by 60% |
| 1 | | | 1 | Credit 1.2 Water Efficient Landscaping, No Potable Use or No Irrigation |
| | | 1 | 1 | Credit 2 Innovative Wastewater Technologies |
| 1 | | | 1 | Credit 3.1 Water Use Reduction, 20% Reduction |
| 1 | | | 1 | Credit 3.2 Water Use Reduction, 30% Reduction |

8 0 9 Energy & Atmosphere

Possible Points 17

| Y | T | N | Points | |
|---|---|---|--------|--|
| Y | Y | | 0 | Prereq 1 Fundamental Building Systems Commissioning |
| Y | Y | | 0 | Prereq 2 Minimum Energy Performance |
| Y | Y | | 0 | Prereq 3 CFC Reduction in HVAC&R Equipment |
| 2 | | | 2 | Credit 1.1 Optimize Energy Performance, 15% & 20% New Construction |
| 2 | | | 2 | Credit 1.2 Optimize Energy Performance, 25% & 30% New Construction |
| 2 | | | 2 | Credit 1.3 Optimize Energy Performance, 35% & 40% New Construction |
| | | 2 | 2 | Credit 1.4 Optimize Energy Performance, 45% & 50% New Construction |
| | | 2 | 2 | Credit 1.5 Optimize Energy Performance, 55% & 60% New Construction |
| | | 1 | 1 | Credit 2.1 Renewable Energy, 5% |
| | | 1 | 1 | Credit 2.2 Renewable Energy, 10% |
| | | 1 | 1 | Credit 2.3 Renewable Energy, 20% |
| | | 1 | 1 | Credit 3 Additional Commissioning |
| 1 | | | 1 | Credit 4 Ozone Depletion |
| 1 | | | 1 | Credit 5 Measurement & Verification |
| 1 | | | 1 | Credit 6 Green Power |

7 0 6 Materials & Resources

Possible Points 13

| Y | T | N | Points | |
|---|---|---|--------|--|
| Y | | | 0 | Prereq 1 Storage & Collection of Recyclables |
| | | 1 | 1 | Credit 1.1 Building Reuse, Maintain 75% of Existing Shell |
| | | 1 | 1 | Credit 1.2 Building Reuse, Maintain 100% of Existing Shell |
| | | 1 | 1 | Credit 1.3 Building Reuse, Maintain 100% Shell & 50% Non-Shell |
| 1 | | | 1 | Credit 2.1 Construction Waste Management, Divert 50% |
| 1 | | | 1 | Credit 2.2 Construction Waste Management, Divert 75% |
| | | 1 | 1 | Credit 3.1 Resource Reuse, Specify 5% |
| | | 1 | 1 | Credit 3.2 Resource Reuse, Specify 10% |
| 1 | | | 1 | Credit 4.1 Recycled Content, Specify 5% (post-consumer + 1/2 post-industrial) |
| 1 | | | 1 | Credit 4.2 Recycled Content, Specify 10% (post-consumer + 1/2 post-industrial) |
| 1 | | | 1 | Credit 5.1 Local/Regional Materials, 20% Manufactured Locally |
| 1 | | | 1 | Credit 5.2 Local/Regional Materials, of 20% Above, 50% Harvested Locally |
| | | 1 | 1 | Credit 6 Rapidly Renewable Materials |
| 1 | | | 1 | Credit 7 Certified Wood |

6 0 10 Indoor Environmental Quality

Possible Points 15

| Y | T | N | Points | |
|---|---|---|--------|--|
| Y | | | 0 | Prereq 1 Minimum IAQ Performance |
| Y | | | 0 | Prereq 2 Environmental Tobacco Smoke (ETS) Control |
| 1 | | | 1 | Credit 1 Carbon Dioxide (CO ₂) Monitoring |
| | | 1 | 1 | Credit 2 Increase Ventilation Effectiveness |
| | | 1 | 1 | Credit 3.1 Construction IAQ Management Plan, During Construction |
| | | 1 | 1 | Credit 3.2 Construction IAQ Management Plan, Before Occupancy |
| 1 | | | 1 | Credit 4.1 Low-Emitting Materials, Adhesives & Sealants |
| | | 1 | 1 | Credit 4.2 Low-Emitting Materials, Paints |
| 1 | | | 1 | Credit 4.3 Low-Emitting Materials, Carpet |
| 1 | | | 1 | Credit 4.4 Low-Emitting Materials, Composite Wood |
| 1 | | | 1 | Credit 5 Indoor Chemical & Pollutant Source Control |
| | | 1 | 1 | Credit 6.1 Controllability of Systems, Perimeter |
| | | 1 | 1 | Credit 6.2 Controllability of Systems, Non-Perimeter |
| | | 1 | 1 | Credit 7.1 Thermal Comfort, Comply with ASHRAE 55-1992 |
| | | 1 | 1 | Credit 7.2 Thermal Comfort, Permanent Monitoring System |
| | | 1 | 1 | Credit 8.1 Daylight & Views, Daylight 75% of Spaces |
| | | 1 | 1 | Credit 8.2 Daylight & Views, Views for 90% of Spaces |

4 0 0 Innovation & Design Process

Possible Points 4

| Y | T | N | Points | |
|---|---|---|--------|---|
| 1 | | | 1 | Credit 1.1 Innovation in Design: Exemplary Water Use Reduction - 40% Reduction |
| 1 | | | 1 | Credit 1.2 Innovation in Design: Exemplary Recycled Content - 15% |
| 1 | | | 1 | Credit 1.3 Innovation in Design: Exemplary Local/Regional Materials, 40% Manufactured Locally |
| 1 | | | 1 | Credit 2 LEED™ Accredited Professional |

A study prepared by the **Heschong Mahone Group** in 1999 looked at the influence of daylight in a retail environment.

- Compared sales performance in 108 stores.
- Two thirds had skylights, one third did not.
- Monthly gross sales per store were averaged over an 18-month period.
- Results demonstrated:

Daylighting boosted sales by an average of **40%**.

(<http://www.pge.com/pec/daylight/daylight.shtml>)



BB's 60,000 sq. foot Amish Grocery in Quarryville, PA uses no electric lighting.